TOBACCO

How to Cultivate, Cure and Prepare for Market.

White Burley Tobacco and its Culture.
Seed Leaf Tobacco and its Culture.

BY
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EXPERT ON TOBACCO FOR
TENTH CENSUS.

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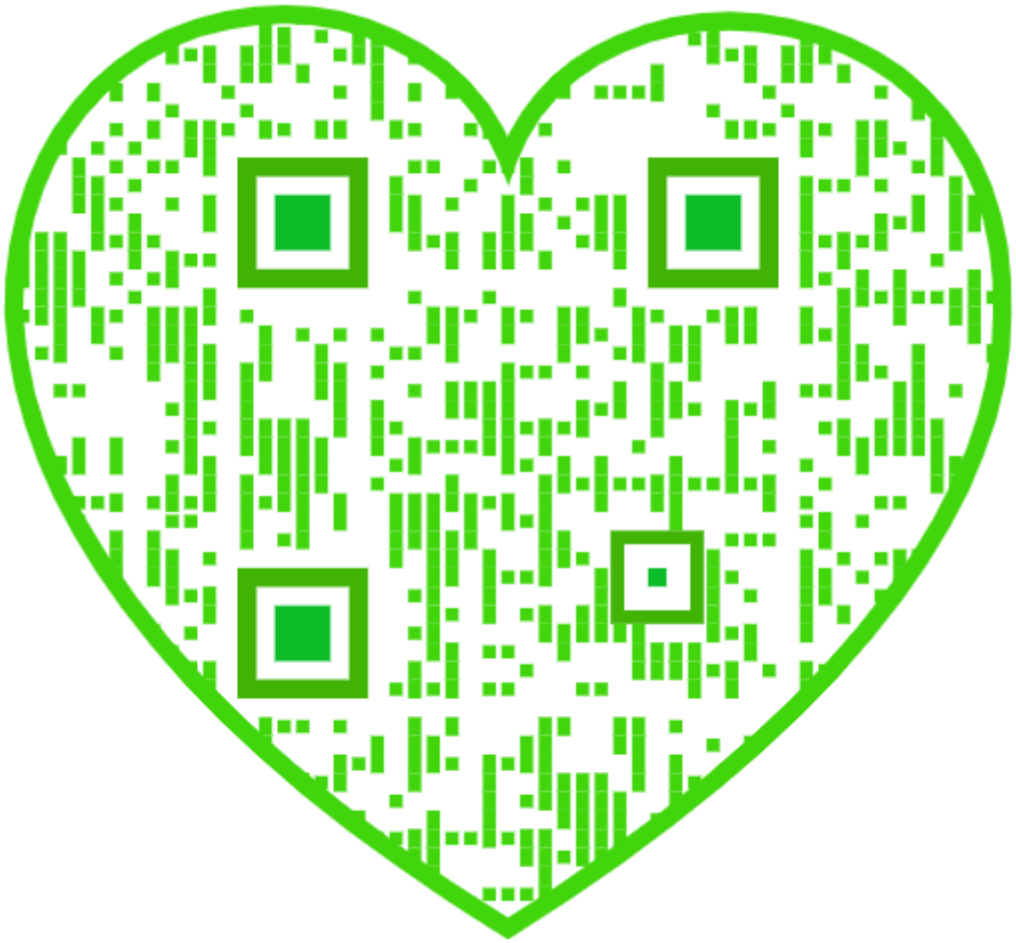

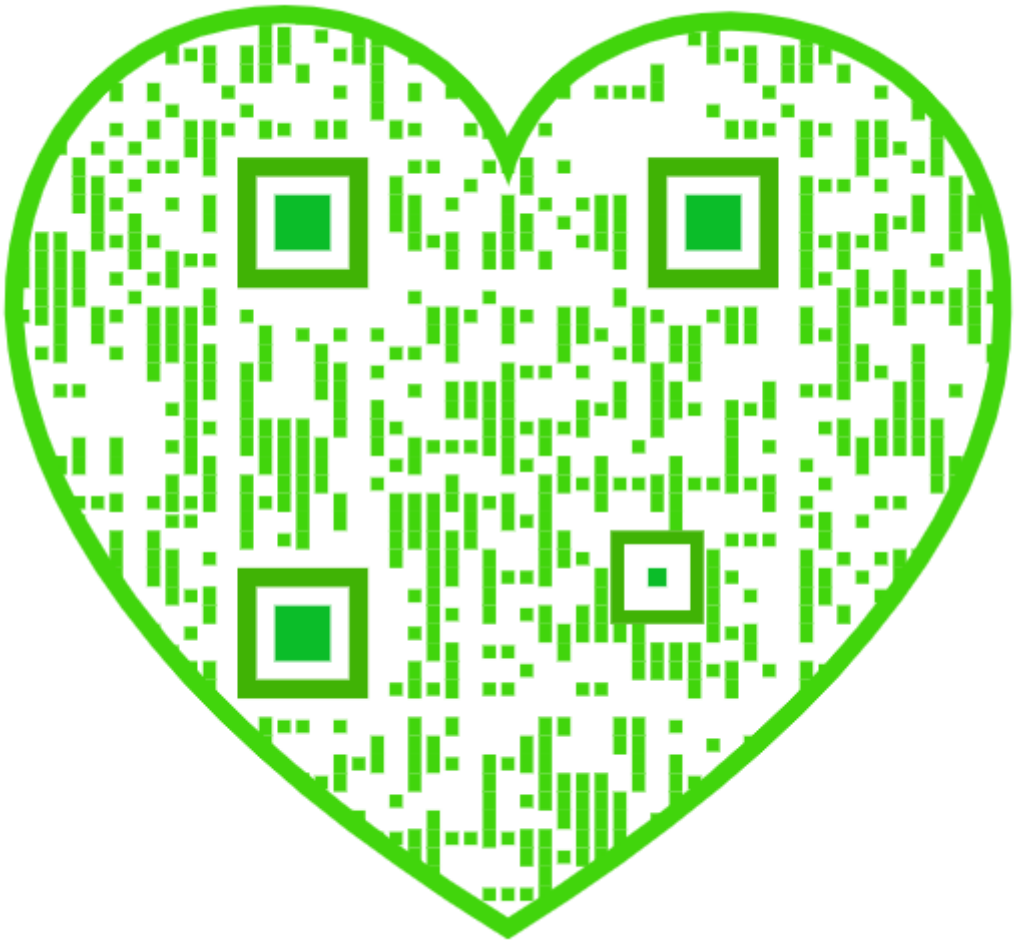

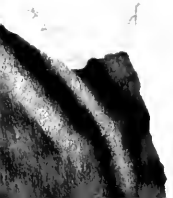

TOBACCO: HOW TO CULTIVATE, CURE AND PREPARE FOR MARKET.

By J. B. Killebrew, A. M., Ph. D., Expert on Tobacco for Tenth Census.

Tobacco is one of the most important crops that enter into the commerce of nations. It is used in every country, from the most savage to the most civilized. Unknown by the nations of the Old World, prior to the discovery of America, is is now used by the human family more than any other article, except tea and salt. Whether it be a good or an evil, it is the least injurious of all the narcotics or stimulants. It does not affect the moral sense like spirituous liquors, opium, hasheesh, cocaine and other drugs of like character, and there is no doubt of the fact that its effect is to lessen the appetite for more injurious substances.

Tobacco belongs to the nightshade family, and botanically is akin to the Irish potato, tomato, red pepper and Jimpson weed, all native products of [illegible]

The plant was first cultivated by the colonists in Virginia in 1586, but did not become of commercial or social importance for twenty of thirty years later when a growing European demand made it a remunerative crop. It was the prime factor in making the settlement of Virginia a permanency. It was almost the only crop of the first settlers that could furnish the means for buying nearly all the necessities required in a new country. From a small beginning, its cultivation has extended until the world's production now amounts to 2,500,000,000 pounds, of which the United States produced, in 1904, 660,460,739 lbs. grown on 800,409 [illegible] In 1899 868,163,275 pounds were grown on 1,101,483 acres. Kentucky led all the States with 314,288,050 lbs; North Carolina second with 503,400 lbs; Virginia third with 122,884,900 lbs. Then came in the order of their rank Ohio, Tennessee, Pennsylvania, Maryland, South Carolina, Connecticut and New York. No other States produce as much as 10,000,000 lbs. The total value of the crop of 1899 in farmers' hands was $[illegible],993,003.

MAKING PLANT BEDS.

The first and most important step in producing a crop of tobacco is to have an abundance of good, strong, healthy plants. The land selected for a plant bed should be of rich soil with a slightly Southern exposure, if possible, in order that the young plants may

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get the benefit of the warm rays of the sun in early spring. This is important to bring them forward as early as possible. The soil uld be a rich, fertile, black loam. Black is preferable because it bsorbs more heat from the rays of the sun than does any other color, and brings forward the plants several days sooner, which is much to be desired by the tobacco grower.

After the wild growth has been cut off and the leaves and trash removed, brush and wood should be piled on the surface in sufficient quantity to burn the top earth to a reddish tinge or soft-brick color. After the bed has cooled, and without removing the ashes, it should be coultered or dug up with grubbing hoes, frequently raked and chopped over with weeding hoes, until the surface is thoroughly pulverized. All roots should be removed, as well as lumps of upturned clay. When nicely prepared mark off beds four feet wide, for convenience of sowing.

One heaping tablespoonful of seed is enough to sow ten yards square or 100 square yards. The seed should be mixed with a peck or more of meal, ashes or land plaster to facilitate its even distribution over the bed. To more surely insure this even distribution, the bed should be sown first one way and then cross-sown. After the sowing tramp or lightly rake the bed with a fine garden rake and then cover with canvas. The edges of the canvas should be tacked to a frame made of scantlings or poles that should form a frame around the bed. A few bent arches made of wire or switches should be stuck over the bed to hold the canvas off the surface. A trench dug on the upper side of the bed is necessary to protect it from the washings of the surface water, that is apt to collect the seed in groups in the low places of the beds.

Beds should be burned as early as possible when the land is sufficiently dry after the Christmas holidays. Those burned and sowed in February and March, when suitably prepared, always do best. Be careful not to use too many seed. When this is done the plants are so crowded that they grow up with delicate, fragile stalks and are unable to resist the shock of transplanting as well as stockier plants.

PREPARATION OF SOILS FOR HEAVY SHIPPING TOBACCO.

A rich loose, well drained, clayey soil is best adapted to the growth of heavy shipping tobacco. Old land that has grown a crop

or clover or cowpeas the preceding year, broken up in the fall, well manured, either before breaking or after, with a liberal application of stable manure is found most favorable to the production of the heaviest types of tobacco. New ground tobacco is generally brighter in color and smaller in yield than that grown on old manured lots. Fall breaking with three horses on deep soils is important, because it destroys to a large extent the cut worms that prey upon the young plants after they are transplanted. In March the land should be rebroken with a two-horse plow and frequent working with a heavy tooth or disc harrow is necessary to put the land in a fine condition of tilth.

FERTILIZING, HILLING AND PLANTING.

All the accumulations of ashes, tobacco stalks and scraps should be scattered over the land before harrowing. These will be found a most valuable addition to the stable manure that should always be applied in the fall. When it is put on the land in the spring, it has a tendency to make the tobacco plant spot, and it grows with so much rapidity that, though the leaves may have ample size, they will be lacking in body and in finish when the tobacco is cured.

When the plants in the seed bed show leaves as large as a quarter of a dollar, it is time to begin to lay off the land preparatory to fertilizing the same and the making of hills. Usually furrows are run both ways across the land three and a half feet apart with a single horse plow, and at the points of intersection of the rows fertilizers are dropped ranging in quantity from a tablespoonful to a small handful. From 150 to 500 pounds are used to the acre, the quantity being regulated to some extent by the strength of the soil and by the amount of stable or other manures previously applied.

In the yellow tobacco regions of North Carolina and in the seed-leaf districts of Pennsylvania as much as 700 to 800 pounds per acre are applied with most satisfactory results. The best artificial fertilizer for tobacco contains the following:

Phosphoric acid	8 per cent
Ammonia	2 per cent
Potash	10 per cent

This is varied by a reduction of the amount of potash to 8 per cent. which, while it lessens the cost, reduces its value as a fertilizer. It is not a wise or economical policy to reduce the percentage of

potash, as this is by far the most valuable ingredient that enters into a fertilizer for tobacco.

Manural applications are rarely made on freshly cleared land, except in the yellow tobacco growing regions on yellowish or whitish soils where they are found to be of the greater benefit in giving vitality and finish to the tobacco. Nessler, Schloesing and other chemists have demonstrated that the combustibility or burning qualities of tobacco are greatly impaired by the use of any fertilizer containing chlorine. Chlorides, such as common salt, muriate of potash, kainit and many other fertilizers containing any form of chlorine should not be employed in growing tobacco. Nitrate of potash, though costly, is an excellent fertilizer for tobacco, as are also cotton seed meal, tankage, dried blood, sulphate of ammonia and nitrate of soda.

Low, wide, flat hills should be made at the crossing of the rows and the fertilizer should be well intermixed with the dirt that goes to form the hills. Each hill should be cut off and patted with the hoe.

The use of fertilizers for the growing of tobacco hastens forward the crop at least two weeks or more. It also adds greatly to the yield of the crop and to the quality of the product. Lands that under ordinary conditions would make a yield of poor papery tobacco lacking in gummy or oily matters and unfitted for shipping purposes, may be made to produce a very high type of tobacco by the liberal application of a well-compounded fertilizer with suitable ingredients. It is now a rare thing to plant tobacco without using some fertilizer. It not only improves the quality and increases the weight of the cured tobacco, but it gives an early start to the plant, which soon grows large enough to withstand the ravages of grasshoppers and other insects.

After the hills are made, the quicker the plants are set out the better. During the first half of May there is usually enough humidity in the soil to make the transplanting safe without rain. It is best, however, to set out immediately after a rain, provided the fall of rain is not so heavy as to thoroughly soak the ground. In this case it is better to wait until the excessive water is drained away. A peg an inch or an inch and a half in diameter and six or eight inches long and sloped for one-third of the length to a blunt point, is used for setting out the plants. A hole is made with it in the

hill into which the roots of the plants are thrust. The dirt is then pressed to the plant by the thumb on one side and the peg on the other. One person usually drops for two setting out. A hand plant, that is an extra plant to begin with, facilitates greatly the planting, as it may be adjusted in the hand in passing from one hill to another. The plant dropped on one hill is the one set out in the next.

CULTIVATION OF THE CROP.

In about eight to ten days after the plants are set out in the open field, they will be so well established that cultivation should begin by running a furrow on each side of the row with a single horse turning plow, the bar of the plow being run as closely as possible to the plants without disturbing the roots and so endangering their vitality. This leaves a narrow ridge with the plants standing on it. Hoes are then brought into requisition to scrape away any grass or weeds that may have made their appearance. It is a good practice to draw a little dirt up around the plants after breaking the crust which generally crowns the top of the ridge. This initial working is probably the most important. For subsequent working cultivators may be run at intervals of a week or ten days both ways through the tobacco. This is especially important after every rain. It is now the practice of the best tobacco growers to use level cultivation. It was once thought necessary to put a supporting hill around each plant at the last cultivation. This practice has been abandoned because it diminishes the area of range for the roots of the plants and also lessens the amount of humidity within reach of the roots and rims hot quickly grows more important as the leaves expand. The land should never be worked when it is wet. When the plants have attained a size that makes it impossible to use a plow or cultivator without damage from the breakage of leaves, it will be found advantageous to cut out with hoes or to pull up with the hands any grass, weeds or bushes that may spring up. Every alien growth will damage the quality of the tobacco.

TOPPING TOBACCO.

The cultivation of the crop usually extends to the time of general topping. Topping is the pinching out of the terminal bud of the plant, leaving from ten to twelve leaves on the stalk. A few of the leaves next to the ground are first taken off, leaving the stalk bare for five inches above the ground. This is called priming, because it removes the first leaves. It is often done before the period

of topping so that the dirt may be thrown up against the stalk. Some planters, however, do not prime at all, and top at about the same height as if primed. To top so as to leave ten leaves on the stalk, it is only necessary for the topper to observe the arrangement of the two lower leaves. The ninth and tenth leaves in ascending order will hang directly above the first and second. If the bud is pulled out above these ten leaves will remain. Tobacco should always be topped when the terminal bud is visible and this process should never be delayed until the blossoms appear. It is not only a waste of the vital energy of the plant to wait for the blossom to appear but the scar made in breaking off these always remains to mar the beauty and symmetry of the upper part of the plant.

SUCKERING AND WORMING.

In a few days after the plant is topped lateral shoots or suckers will begin to grow from the axilla of each leaf. These must be removed before they attain the length of two inches or more. This work must be done at least once a week until the tobacco ripens. To permit the suckers to grow will be to diminish the weight and quality of the tobacco, making it, when cured, thin and chaffy. Suckers appropriate the substance of the leaves to their own growth and absorb the vitalizing sap that should go to the generation of oily substances for the thickening and the maturing of the leaves.

Simultaneously with the removal of the suckers the horn worm should be sought after and destroyed. There is no enemy so much to be dreaded by the tobacco grower as this insect. The moth or the larva is a dusky brown-winged miller nearly as large as a humming bird. It may be seen almost any evening in July and August hovering over and sucking the blossoms of the Jimpson weeds, petunias and other kindred blossoms. This moth deposits a small greenish egg upon the surface of the leaf, which will gradually turn to a light yellowish color, from which in a short time issues a tiny cream-colored worm not larger than a horse hair in diameter and about one-eighth of an inch long. It begins to eat as soon as it leaves the egg shell, and unless caught will continue its ravages until fully grown, which requires about three weeks.

Some interesting experiments on the life-history of this insect have been made by the Director of the Agricultural Station of Kentucky. He thinks there are three broods of worms that make their appearance instead of two, as commonly believed. The number,

however, may vary with the character of the weather. The experiments systematically conducted at this station demonstrated the virtue of sprinkling the plants with Paris green for the destruction of tion of this dreaded pest. About one pound of Paris green to 160 gallons of water will be sufficiently strong. Three sprinklings should be made; one early in July and two in August, about the first and 15th of the month. The thing to do is to apply the poison as soon as the young worms begin to appear and continue at intervals until the tobacco is housed.

It was once thought the use of Paris green on tobacco would subject the users to the danger of being poisoned, but is has been shown that the amount of poison left on the cured leaf is so infinitesimally small as to be almost incapable of detection by the severest tests. Its application is, therefore, harmless to the consumer of the cured product, even though the tobacco should be taken in the stomach.

By the use of Paris green for the destruction of the horn worms, the capacity of the tobacco grower is largely increased. The limitation of the acreage heretofore has been the ability to keep the tobacco clear of worms.

Many of the moths which are the fecund mothers of the tobacco worm may be destroyed by injecting a solution of sweetened cobalt into the flowers of the Jimpson weed. The solution should contain water one pint, honey, sugar-syrup or molasses one-quarter of a pint to one ounce of cobalt. This put into a small syringe or squirt gun may be easily injected into the throat of the blossoms. The efficacy of this poison in destroying the moths is fully shown the following morning in the number of dead flies that may be picked up. For fifty years this method of destroying the flies has been practiced and is still in favor.

Hand picking of worms is a very tedious process, but it is still relied upon by the great majority of tobacco growers. One hand can, with difficulty, worm and sucker a half acre a day when the worms are at all abundant. Every large worm left will destroy the best part of a full-grown leaf in a week. This work requires vigilance, regularity, diligence and persistence. Every leaf eaten in part by the worm is a loss both in weight and quality. In fact, all badly worm-eaten leaves are classed with lugs, the lowest grade made in assorting the cured tobacco.

A drove of turkeys, if kept in a tobacco field, will be a valuable ally in destroying the worms. They soon learn to find them, and it is almost incredible how many worms will be destroyed in a day by a large drove of turkeys, who seem to feed upon them with relish.

TOBACCO HOUSES.

It would require a long paper to give a clear idea of the various styles of curing houses. Many believe that no improvement has been made on the old log barn twenty feet square, well daubed and four or five firing tiers in height. Such a barn may be filled in forty-eight hours with a half-dozen good hands. The tobacco so housed will be more uniform in color and will cure more evenly. The fires may be better regulated in such a structure and the danger from house-burn is lessened. The risk of losing the whole crop by fire is diminished with a large majority of the tobacco growers who usually grow enough to fill several such small barns.

But as the logs for building such bars are becoming scarce in the tobacco growing districts, frame barns from 30 to 50 feet square or oblong are erected with four rows of posts, either let into the sills or placed upon a rock foundation. The distance between the lines of posts is usually about twelve feet. The girders are let into the posts, the first nine feet above the ground and others four feet apart vertically. The tier poles rest upon these. The barns are usually enclosed with upright plank, windows being left under the eaves of the roof and also in the gables to permit the egress of smoke and to serve for the admission of dampness to bring the cured tobacco to a condition for handling. A barn with the capacity to cure ten acres should not cost more than $150.

HARVESTING THE CROP.

The first tobacco cutting in the heavy growing regions of Kentucky, Tennessee and Virginia is usually done about the 10th of August, sometimes a little earlier and sometimes later. The work of worming and suckering must be actively and energetically kept up until that period and even beyond, at intervals, until the entire crop has been harvested.

From six to eight, rarely ten, weeks after the tobacco has been topped the leaves assume a yellowish, mottled color or a deep green, thick, corrugated appearance. The granulated surface of the upper side of the leaf is a sure indication of maturity. At this stage a piece of the leaf bent between the fingers will snap with a clear-cut

broken, leaving the piece adhering to the main leaf only by the thin delicate tissue or integument forming the under surface.

It would be a conjunction of most fortuitous circumstances to bring all the plants in a field to maturity at the same time. There must be uniformity in soil fertility, exposure, cultivation and topping of all the plants at the same time, or a reduction in the number of leaves left on the plants at a second topping for all of them to be in the exact condition for harvesting at the same time. Usually about one-half or two-thirds of the plants in a field will be ready for the knife at first cutting. If there should be any question as to the maturity of the plants it is best to let them remain for a short time longer before beginning the harvest. The last days that the plants remain in the field before maturing are most fruitful in the storage of gums, resins and the so-called fatty matters that give the greatest value to the product. There is as much difference in the fragrance of ripe tobacco and green as there is between a ripe peach with its luscious juices and a green one with its acidity and acridity.

No tobacco should be cut immediately subsequent to a hard rain, because much of the gummy matter so necessary to its fragrance and usefulness that has been secreted upon the upper surface of the leaves will be dissolved and washed away. Nor should tobacco be cut when there is a probability of a rain, for the reason that if caught in a shower of rain after it has been cut it is liable to be bespattered with dirt and its value impaired. Nor should it be cut when the dew is on the plant, for when inverted upon the ground after the stalk is severed a considerable quantity of dirt will adhere to the wet leaves. The best time for cutting is in the afternoon when the fierceness of the noonday sun has been tempered by the coolness of evening. A cloudy or foggy day when there is no immediate prospect for rain is a good time to cut tobacco. If cut while the sun is hot many of the leaves will be blistered, or sunburned, a condition for which there is no remedy. The green spots made by sunburn impair the quality and destroy the beauty of the product after it is cured. The most careful attention, therefore, should be given in protecting the green plants from sunburn.

The instrument most commonly used for cutting the plants is a butcher knife. The stalk is first split down to a point within three or four inches of the lower leaves and then severed immediately be-

low these leaves and turned over on the ground. After remaining in this condition long enough to wilt sufficiently to be handled without breaking the leaves, the plants are piled from six to ten in a place, the number being regulated by the size of the plants. These are afterwards straddled over a stick stuck in the ground at an angle of about sixty degrees, the stick sloping from the sun to lessen the effect of the direct rays so apt to burn the tobacco. Some planters prefer to haul the plants to the curing house before stringing them upon the sticks, but this practice has been for the most part abandoned. There is only one thing to commend this method, and that is, the tobacco is taken up and more quickly and removed from exposure to the sun's rays and therefore is less likely to be damaged by sunburn.

After the tobacco plants have been strung on sticks about four and a quarter feet long and about one inch and a half in diameter, they are hauled to the curing houses and arranged on the tier poles with a distance of about eight inches between the sticks. It was once almost a universal practice to put the sticks of tobacco on a scaffold erected in the field. The advantage in this is that more may be hauled in each load. When the distance between the tobacco field and the curing house is as much as a mile, this practice is to be commended. All leaves broken from the stalks should be strung separately upon a stick.

CURING OF HEAVY TOBACCO.

The curing of tobacco after it has been arranged properly in the curing barn is at once a difficult and, to some extent, a dangerous operation. If the fires are not placed under the tobacco at the right time it is apt to houseburn, which is as bad as sunburn, being a half decayed condition of the leaf in which all or nearly all the substances that give strength and value to the cured tobacco are destroyed, leaving only the form of the leaf, stiff, harsh and well-nigh worthless. Houseburn is caused by heat evolved by the crowded condition of the leaves, which prevents the air from circulating freely. A moisture is generated by the sap and heat which produces a fermentation and causes the partial decay. To prevent this fires made of two logs lying in pairs at intervals of five feet on the floor of the barn should be started after the tobacco plants begin to turn yellow. For twenty-four hours these fires should keep the tempera-

ture of the barn to about 90 degrees, and after this the heat should be increased to 100 to 120 degrees.

The heavy tobacco planters, previous to 1870, fired much harder than they do at present. Keeping up very hot fires without cessation for four or five days was then the general method of curing the tobacco. Now much gentler fires are kept up for four or five days, then they are extinguished until the tobacco leaves become pliant, when the fires are again kindled and kept going gently, day and night, for about thirty-six hours or until the leaves become dry the greater part of their length while the stem and stalk remain green. The fires are again withdrawn and re-kindled alternately as the tobacco leaves become dry or in a humid condition. It now requires from ten to fifteen days to complete the curing of a barn filled with green tobacco. The larger the tobacco plants and the more they are engorged with sap, the longer the time required for a successful cure.

It is justly claimed by the tobacco growers of the present time that a greater uniformity in color and a more beautiful finish are produced by allowing the tobacco leaves to absorb humidity frequently during the process of curing. It is a good practice to dry out the tobacco whenever damp weather occurs. If long continued rains surcharge the stems with excessive moisture a rot is engendered which at once injures the quality of the tobacco and reduces its weight. A nicely cured black or brown stem, pliant but firm of texture, is greatly to be desired.

Sometimes tobacco, and especially that grown on newly cleared land, cures a beautiful yellow color, but if allowed to "come and go" in "order," will become reddish in color. If there is a demand for the yellow leaf, the color may be retained by kindling fires under the tobacco every morning until the stems and stalks are cured. It should then be bulked down or crowded closely together on the tier poles so as to preserve the yellow color.

All tobacco perfectly cured both as to leaves, stem and stalk, should be taken from the tier poles when in proper order and bulked on a platform elevated above the ground six inches or more. This platform should be about five or six feet wide and of a sufficient length to hold all the tobacco in the barn when the bulk is built up to the height of four or five feet. When finished the bulk should be covered with plank or tobacco sticks and weighted down. If the

sides of the bulk should be protected from drying winds by old carpets, blankets, straw or wagon sheets, the tobacco will be in a condition for assorting and stripping at any time during the winter months.

The inquiry is frequently made if tobacco cured by atmospheric influences alone is not as sweet and salable as that cured by fires. The tobacco used mainly for home consumption, such as the White Burley seed leaf and Havana leaf varieties is almost always air-cured. The tobacco used for exportation is, for the most part, cured by the use of artificial heat. Experience has demonstrated that tobacco cured by fire will pass through the sweat of summer much better than that air-cured, and will also be less liable to injury from a sea voyage. Many European consumers also like the creosotic flavor produced by smoke, and this makes a steady demand for the open-fire cured tobacco. Consumers in the United States like also the flue-cured tobacco of North Carolina and Virginia, but this is free from the smoky flavor that characterizes the tobacco cured by open fires. The flue-cured tobacco is sweet to the taste, delightfully fragrant and is more in demand as a chewing tobacco than the cheaper brands made of air-cured White Burley or the lighter sorts cured by open fires, though the latter is preferred by sailors, lumbermen, farm laborers, and miners, on account of its great strength.

ASSORTING AND STRIPPING.

Tobacco is assorted by separating the various colors and qualities and afterwards arranging these into different grades.

In almost every crop there may be found bright and dark tobacco, heavy and light, long and short, the result of different plantings, of diversified soils, of freshly cleared lands, or of manured lots.

At the time of harvesting, much may be done in keeping the product of new lands and that of old lands separate, as well as long tobacco and short tobacco. This will relieve the planter of much trouble when the time for stripping arrives.

The most careful and discriminating hands only should be permitted to sort tobacco. To do the work properly, good sight, good judgment and close attention are all needed in the assorter.

A few bad leaves appearing with the good in a sample drawn by an inspector will reduce the price of the hogshead almost to the level of the price of the bad leaves. Short leaves appearing in a bundle of long tobacco, or bright leaves in a bundle of dark to-

bacco, or rich with poor lea[illegible], all violate the primary laws of classification and injure the sale.

Three classes, subdivided into three others, are usually made in assorting heavy shipping tobacco:

1. Lugs, which represent ground leaves and those badly worm-eaten, blistered, field-fired, house-burned, and these may be sub-divided into light lugs and heavy or snuff lugs.

2. Seconds, which represent that portion of the crop which is slightly worm eaten or field-fired, off-color, short, thin or papery. These may be sub-divided like the first grade.

3. Good, or selections which are made up of those leaves best matured, best cured, and which have the best color and best body. This grade may be sub-divided into long or short, heavy or light.

In tying up the leaves into bundles, an inferior leaf may be used and this is generally taken from the lowest grade and well dampened. However good the tie leaf may be, it is reduced to a lower grade by being wound around the head of the bundle.

If the tobacco is to be delivered to a stemmery, any number of leaves that may be convenient for handling may be tied into a single bundle. The larger the bundle the better, but if it is to be prized into hogsheads from five to eight leaves make a bundle of proper size, the larger number of leaves being used for the inferior grades.

If the tobacco is in proper order when first taken down from the tier poles, it may be bulked as fast as stripped, but if it is too high or too dry it will be necessary to put the bundles on sticks and hang the tobacco up in the barn again for re-ordering.

The most approved condition for permanent bulking and prizing is one in which the leaf is damp enough to open freely without breaking and the stems near the larger ends will crack but not break when bent. In this condition it will keep through all seasons, will go through the sweat with improvement and will bear the ocean voyage without damage.

As the prizing of tobacco is now rarely done by the tobacco grower but by experts who have made a study of it, I do not deem it necessary to extend this paper by describing this work. Rarely does the planter grow a crop large enough to make all the classifications demanded by the various markets. A cask containing types suited to several markets is limited to one buyer, viz., the re-handler.

In a crop, say, of 50,000 pounds there may be several hogsheads of these mixed types or grades and but few specially suited to any one of the foreign markets. So it has been shown by experience that it is much safer for the planter to sell his tobacco loose or to unite with several others in having it prized than to prize it himself.

WHITE BURLEY TOBACCO AND ITS CULTURE.

By J. B. Killebrew, A. M., Ph. D.

The natural variation in the species of tobacco has brought about some wonderful economic results. This was especially true of the White Burley tobacco, a variety that within the past four decades has increased in production more rapidly than that of any other variety whatever. The fortunate development of this variety, so well suited to the requirements of our domestic manufacturers in making plug tobacco, has wrought a complete revolution in tobacco culture in many parts of the country.

HISTORY OF WHITE BURLEY.

The White Burley had its origin in Brown County, Ohio, in 1864. A farmer named George Webb, living near Higginsport, in the spring of that year, sowed the seed of the Red Burley, said to have come from the farm of Jos. W. Barkley, of Bracken County, Ky. A part of the plants on one side of the bed had a creamy, sickly appearance. These were thought to be worthless for transplanting, but being hard pressed for plants enough to set out his crop, Mr. Webb made use of a few of these white plants rather than go to a neighbor for a quantity sufficient to finish his field. For two or three weeks the white plants grew but little, but after becoming established and well rooted they grew with remarkable rapidity, soon reaching large size and retaining all their creamy richness of color. They ripened two weeks earlier than the green plants set out at the same time. When cured in the ordinary way, by atmospheric influences, there was a whitish tinge on the under side of the leaf, while the upper surface was of a beautiful golden yellow. A few plants were cut and cured which measured six feet in length and were put on exhibition in the Bodmann warehouse in Cincinnati. These plants attracted a great deal of attention and interest among the tobacco men who examined them. Buyers gave encouragement to their further cultivation.

The next year, 1865, Mr. Webb planted ten acres and produced 10,000 pounds of tobacco, which was exceedingly handsome and silky, having all the characteristic marks of coloring which the sample of the previous year had displayed. When offered on the market it brought from 25 to 45 cents per pound, and a premium of $300 was awarded, in addition to this large price, to the successful grower.

The White Burley district lies on both sides of the Ohio River, and occupies about twenty-four counties, in whole or in part, in Kentucky, and three counties exclusively in Ohio, viz., Adams, Brown and Clermont, and parts of counties in the Spangled or Eastern Tobacco district of Ohio lying in the Southeastern corner of the State. The boundaries of the district in Kentucky are limited by the Ohio River on the North, and by lines on the South and East passing from Louisville, Kentucky, to Paris, and from the latter place to Portsmouth, Ohio.

TOPOGRAPHY AND SOILS.

The surface of this region is greatly diversified. High ridges and knobs, rising from 300 to 400 feet above the valley of the Ohio River, are alternated by deep ravines and rocky gorges. There is a lofty elevation known as Dry Ridge, upon which the Cincinnati Southern Railway passes through the center of this district from North to South. Innumerable spurs shoot out from this ridge, and are often cut by the transverse gorges into conical hills, with sometimes gentle, but often abrupt slopes. Numerous rills, creeks and rivers ramify the entire district, while level stretches of land are to be seen in the southern portions of the district around Georgetown and Lexington and in several counties in Central Kentucky. The geological formations for the most part belong to the lower silurian, the rocks are limestone, and the tree growth is oak, hickory, walnut, beech, poplar, sugar tree and other varieties indicating great original fertility in the soil. The unevenness of the surface makes tillage difficult, and great care must be taken to prevent the rapid destruction of the upper soil by surface washings. Blue Grass is indigenous to the entire district, and covers with its verdant turf the slopes of the hills and the rich valleys between. All the rocky beds of the lower silurian are exposed in some parts of the district. Many of these beds are thin, flaggy and soft, undergoing a rapid disintegration when exposed. The soils derived from the blue limestones have great strength of constitution, for though apparently exhausted, the dissolution of the rocks soon adds the necessary inorganic elements, while the turf of the blue grass that carpets the surface supplies all the humus required to restore the soil to its pristine fertility. It is a fact well established that phosphoric acid abounds in the limestones of the district, and is by far the most valuable of all fertilizing elements in any soil. Dr. Peter, of the Geological Survey,

ascertained by chemical analysis that some of the soils in this district contain as high as .466 per cent. of phosphoric acid, while the richest soils of Todd county contain only a third of this quantity. He ascribes the fertility of the soil of this region:

First—To its state of extreme division.

Second—Its large proportion of phosphates and the alkalies.

Third—The great amount of organic matter.

The latter ingredient gives the soil its rich black or brown color, makes it light and very retentive of moisture and gases favorable to vegetable growth. This organic matter materially aids in the solution of the mineral elements of vegetable nutrition, and by its decomposition furnishes plants with a large supply of the most assimilable plant food.

The soils of this region contain fourteen times as much lime, three times as much phosphoric acid, and twice as much potash as the sandstone soils of the coal regions. The large content of oxide of iron and alumina as shown to exist by the analysis of Dr. Peter, contributes to their durable fertility and the rapid powers of recuperation, by assimilating through leguminous plants ammonia from the atmosphere. In addition the alumina prevents the soluble salts from filtering away from the roots of plants and also supplies soluble salts of potash by disintegration. The gradual liberation of potash from the alumina of the soil accounts for the fact, which is well known among the tobacco growers of the district, that a field planted in tobacco for two or more years in succession apparently becomes exhausted for the production of another crop, but when seeded to grass or clover, and allowed to remain in pasture for a few years, it regains its fertility, and shows no permanent injury in consequence of the previous crops of tobacco taken from it.

The subsoil of this region is also very rich in mineral fertilizers. Phosphate of lime is of common occurrence in appreciable quantities —not, it is true, existing in the form of crystallized or massive apatite or coprolite, but disseminated through the whole body of the limestone rocks to such an extent that many beds, if crushed to powder, would make an excellent fertilizer. This makes it impossible ever to destroy the fertility of the region permanently, even by the most injudicious cultivation. The subsoil and the rocky strata beneath constitute an accumulated capital held in trust for future generations; while the surface soils may be compared to the avail-

able interest subject to the uses of its present owners. The latter may be improved or dissipated by bad tillage, by excessive croppings, by washings; but no limit of time may be assigned beyond which the blue limestone lands shall cease to have a permanent value. Nature is forever at work in deepening the soil and restoring the ravages af cultivation. The midsummer suns warm and expand the rocks; the rains fall and penetrate them; frosts turn the moisture into an infinite number of little wedges, which enter, and tear, and split, and crumble the surface into dust, and thus from year to year, from generation to generation, from century to century, the work goes on, constantly meeting the interest demanded by each successive age.

The following is an anaylsis of the typical soil of this region as made by Dr. Peter:

Organic and volatile matter	7.771
Alumina, oxide of iron and manganese	12.961
Carbonate of lime	2.464
Magnesia	0.173
Phosphoric acid	0.319
Sulphuric acid	0.170
Potash	0.393
Soda	0.130
Sand and insoluble silicates	75.266
Total	99.647
Moisture driven off at 300	4.700

Some other analyses may show larger quantities of phosphoric acid and potash, but the above is a fair average. Dr. Peter, in the course of his investigation, took the pains to make an analysis of the richest prairie soils of Illinois with those of the region under consideration. The large amount of available nourishing plant food to be found in the former gives great luxuriance to the growth of the first crops. It has probably greater immediate fertility, but none of the durability of the blue grass soils. It has a larger interest but smaller capital, and when the accumulated available soil is once consumed or exhausted by thriftless husbandry, there is no inherent power left to make restitution for the destruction.

There is a class of soils which occurs in the counties of Owen, Gallatin, Grant and Boone in Kentucky, derived from a silicious mudstone far inferior in productive capacity to the blue limestone soils. This mudstone is buff in color and is probably 100 feet in thickness and from 200 to 300 feet above the Ohio River. The soil

from it is poor in lime and potash, but rich in sulphuric acid. Owing to the central portion occupied by the mudstone in the vertical range, the strongest soils are found capping the greatest elevations or in the valleys. The character of the mudstone soil is, however, greatly improved by the presence of limestone gravel which rolls down from heights above and commingles with the soil. Oak, poplar and sugar tree are the prevalent growths on the best quality of this soil. Beech forests with a sobby soil characterize more generally the mudstone, and such lands are of inferior value, both for the growing of tillage crops and for the grasses. In the eastern portions of Lewis and Fleming Counties the stiff soils of the Devonian shales appear, below them the brownish red soils derived from the magnesian limestones of the upper silurian formations.

The portion of the White Burley district lying in Ohio consists of a river basin fringed by cliffs of modified drift, rising to the height of 500 feet above the Ohio River, and in topographical outline is the counterpart of the district in Kentucky. The bluffs run off into a plateau, sometimes deeply washed by the numerous tributaries of the Ohio and Little Miami rivers, but generally the erosion has not been deep, and frequent instances occur where small streams meander for many miles through broad valleys. Broad areas of level land occur, sometimes so flat that in times of excessive rains they overflow, and form temporary inland lakes. Limestones of silurian age, are often found cropping out in this district. Some of these beds are full of fossils, and analysis shows that potash, soda and phosphoric acid, as in the Kentucky limestones, enter largely into their composition.

The drift of glacial deposits are extensive and contribute mainly to the formation of the soils. This origin gives them a somewhat different character from those in Kentucky derived immediately from the underlying limestones. The drift is composed largely of clay, and its thickness upon the rocky strata varies from 10 to 50 feet. Its usual thickness, however, is about 20 feet, and it is composed for the most part of the following materials, beginning at the surface and descending:

1. Surface clays, creamy in color, sometimes darkened by an accumulation of humus, especially in swamps or basins.

2. Yellowish clays, abounding in limestone gravel, forming the surface where the first had been carried away by denudation.

3. Forest bed, a dark carbonaceous clay abounding in the remains of vegetable matter—often peaty, generally resting upon a bed of bog-iron ore one or two feet in thickness.

4. Hard pan, a blue, compact, putty-like mass, with occasional layers of inter-collated sand. This last usually rests upon the bed-rock.

There are four classes of soil recognized in this district north of the Ohio River, viz.:

1. Native soils, formed from the disintegration of the bed-rocks of the country.

2. Drift soils of the uplands.

3. Black soils of swampy areas.

4. Alluvial of the river bottoms.

The native soils are not widespread, but are confined, for the most part, to the slopes bordering the streams. Some of them abound in vegetable humus, are dark in color, very friable and exceedingly fertile. This fertility comes from the carbonate of lime, potash, soda and phosphoric acid, which abound in the rocks, and their fertility is still further increased by the arenaceous character of the limestones from which they are derived, which makes them open and light. On account of the general unevenness of the surface, where they exist, they wash easily but are the soils preferred for tobacco. The principal trees are sugar, maple and walnut.

The drift soils are capable of subdivision into yellow clays and white clays.

The yellow clay soil is derived from the weathering of the drift, which in this region is largely composed of gravel. There are occasional seams of sand and gravel in the soil. The surface, however, is made up of one or two feet of whitish clay, fine-grained, comparatively free from gravel, which is due in part to the decay of vegetable matter, and in part to the work of earth worms and animals which bring up fine particles from beneath. The white clay is identical in character with the last described, except as to origin, and changes to a yellowish hue under the surface. Analysis shows a considerable amount of potash and soda in its composition, as well as phosphate and carbonate of lime and carbonate of magnesia. It also contains over 6 per cent. of the sesquioxide of iron.

The black soils of the swamps are, for the most part, composed of humus in a greater or less degree of decay, and when sweetened by aeration are very durable and highly productive.

The alluvial soils of streams partake of the nature of the region whence their material has been derived, sometimes being very sandy, sometimes gravelly and at other places highly argillaceous and stiff, but generally very productive.

The soils on the smaller streams are not generally so sandy as those on the Ohio River.

TWO CLASSES WHITE BURLEY TOBACCO.

In the White Burley districts of Kentucky two different classes of tobacco are produced from the same variety planted. In the counties of Owen, Franklin, Henry, Oldham, Scott and Trimble cutting tobacco, or what may be used for cutting purposes, was until within a recent period grown almost exclusively, while in the remaining counties of the district heavier styles used for fillers mainly are now and have heretofore been grown altogether. Latterly, however, both cutters and fillers are grown in the section of which Owen County may be considered the center. All observant cultivators agree that the character of the soil determines the quality of the product, other conditions being equal.

Bottom lands and black soils grow coarse, bony tobacco, long but not fine.

Eastern or Southeastern slopes have open soils and will produce a quick growth, which is essential in making a porous product. These are preferred for making the finest classes of tobacco, especially when they have stood in grass for many years and have long been cleared. Newly cleared land makes a very bright, thin cutting leaf, which at one time commanded the highest prices.

Before the introduction of the White Burley variety, a variety called Twist Bud was grown on new land for making the highest styles of cutting leaf. Ridge-land has a fine grained soil, and does not produce such rapid growth, which is necessary to give absorptive capacity to the product. The product on such land is therefore not so valuable. West lands, or lands facing west and mudstone lands are cold and clammy, and produce a slow growth, making a hard, compact quality of tobacco, of dark color and poor powers of absorption.

On the Northern slopes or North lands as they are called, the product is very rich, heavy and gummy, deficient in color, and though more pounds to the acre are produced, the quality is not such as commands the highest prices.

In Kenton and other counties, where there are sandy soils of a very fertile character, the highest type of Burley Tobacco is grown; the heaviest and darkest product on deep, reddish loam soil, and the lightest and often the highest priced article, used both for wrappers and fine cut, is grown upon white oak lands.

TOBACCO IS AFFECTED BY SURFACE AND SOILS.

The quality of the product, as affected by the surface exposure and the character of the soils, both in Ohio and Kentucky, may be summarized as follows:

On new lands the product is thin, light and bright, and suitable for cutters.

On second year land the product is heavier, with more body, often cherry red in color, and suitable both for cutters and fillers, but in an inferior degree.

On old sod land the product is of better body, less color, more useful for plug fillers with more pounds per acre.

On alluvial or black soils the product is dark in color, rough, bony, lacking in softness and low in absorptive capacity.

The order of preference as to exposure is: 1. Eastern or Southeastern; 2. Southern; 3. Northern; 4. Western. Beech lands are preferred for the White Burley variety, but the oak lands were formerly preferred for producing the cinnamon colored fine cutters.

There is one point of difference between the soils of this district as they occur in Ohio and Kentucky. In the former state they are mainly derived from the drift and are usually tender.

RAPID DESTRUCTION OF SOILS.

It is a source of disquiet to the well wisher of his country to observe the rapid destruction of the soil in this district—within a quarter of a century the diminution of the yield of the staple crop has been from 25 to 50 per cent. Very few farmers pay any attention to the fertilization or preservation of their soils. The hills are scarred and ribbed with deepening gullies, down which the rich plant food is carried with every rain. The district in Ohio has no such natural reservation of soil power as the land in Kentucky, and when once exhausted the work to reclaim the land will cost as much or more than it will be worth when redeemed. From the testimony at hand, not one farmer in five in Brown, Adams or Clermont

Counties considers it necessary to apply fertilizers to restore or preserve the fertility of the soil.

I have thus given an outline of the character of the soil in what is known as the White Burley district, but the reader will make a grave mistake if he should be led to believe that this variety of tobacco is grown nowhere else. It is now planted in Virginia, Tennessee, West Virginia, Missouri, Maryland, Indiana, Ohio and Arkansas, and in nearly every district in Kentucky. The truth is, there has been a White Burley mania among the farmers of the Southern tobacco-growing States, but it has nearly run its course. Whenever the prices for this variety and the heavier styles shall be equilibrated the farmer of each district will return to the production of such types as may be best and more profitably produced in his district. In flavor, in substance, in strength of the essential ingredients of tobacco, the White Burley variety is inferior. Its greatest recommendations are its highly absorptive quality, its mildness and its less baleful effects upon people of sedentary habits. Its absorptive capacity being over twice as great as the rich, gummy type, makes it exceedingly profitable to the manufacturer, while its mildness permits it to be used by the weak and the nervous with comparative impunity.

This variety has few qualities that old tobacco growers would call good. It is very weak. It is thin. It has hardly gum enough in its composition to make it supple. It is probably the mildest tobacco grown, and is admirably suited on that account for consumption by a large class of persons of weak nerves, to whom the use of stronger tobacco is a positive injury.

Since 1872, at which time it began to be used for making plug, (before used for making cutting tobacco) it has well-nigh superseded all other varieties in the manufacture of plug. The "sweet" chew of Missouri, the sun-cured product of Virginia, and, indeed, all the favorite types theretofore used by the plug manufacturer, have been dethroned by this tobacco king of the Ohio Valley, and still the conquest extends. France calls for it; England wants a part of its supply from this variety and Italy is buying it.

A prominent New York tobacco dealer thinks its popularity is due to the highly-wrought nervous condition of the American people. Persons performing outdoor work, sailors, fishermen and farmers, and all with strong physical constitutions, reject it and prefer

types richer in the essential properties of tobacco, but persons of sedentary habits, students, clerks, merchants, professional men—all prefer the milder form as represented in the White Burley variety.

Three-fourths of this product is taken for the home trade. It is used for making fine cut, for plug fillers, for smokers, and it has been used to some extent in the place of mahogany wrappers for plug.

A few years ago when there was a very limited demand for fillers, the principal object of the grower of the White Burley variety was to increase the proportion of cutting leaf and to diminish the quantity of fillers. The tobacco was planted thickly and topped high, so that thin and gumless leaves, suitable for cutting, might predominate. A wider space is given to the plants when it is sought to produce more gum, body and sweetness, and each is used in the manufacture of domestic plug.

PREPARATION OF LAND FOR WHITE BURLEY.

In the White Burley districts of Ohio, composed mainly of the counties of Adams, Brown and Clermont, on the Ohio River, the soil intended for tobacco is prepared by turning it either in the fall or early spring, going to the depth of six or eight inches. Just before the plants are large enough to transplant, the soil is again broken, usually with a disc harrow so as not to reverse the soil, and by repeated harrowings afterwards it is reduced to a fine state of pulverization. The distance between the rows is variable. Some farmers prefer a width of two and one half feet, others three, and some three and a half and even four feet. The latter distance is preferred when tobacco of good body is desired, but when the object is to make a cutting leaf the shorter distances are adopted. When the field has been marked off in one way the plants are set usually with a machine twenty-two inches apart on the mark.

In the White Burley districts of Kentucky old sod land is generally preferred. This is also broken in the fall or early spring and allowed to remain in this condition until about the first of May, by which time the sod will be well rotted. The soil is then disced and well pulverized, the land is then marked off for planting, the marks being three feet to three feet eight inches apart. The plants, without hills, are set in the marks at the distance of about twenty inches

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or two feet apart, so as to have about 7,000 plants to the acre. Some prefer a shorter distance for the plants in the rows, under the impression that the shorter the distance, to within eighteen inches, the smaller will be the stem and fibres. Others aim to produce tobacco of a little heavier body that may be used either as a heavy cutter or as a bright filler.

It is claimed by some excellent planters that a silkier quality of tobacco may be produced by cultivating the sod land the first year in corn, following the corn with tobacco, but the experience of a majority goes to demonstrate that tobacco following blue grass does best. When planted after timothy sod it is greatly troubled with insects, and when planted after corn it is lacking in suppleness.

CULTIVATION OF WHITE BURLEY.

About six days after the plants have been set, and when they are fully established, one furrow is run between the rows and some dirt pulled up to the plants. It is claimed by some of the very best growers in Owen County, where probably the highest grade of product is made, that no advantage whatever is derived from making hills to receive the plant; that the mark or furrow upon the lower side of which the tobacco is set, serves to protect the plants against excessive rains; that it makes it easier to plow without danger of covering the plants with dirt, and that it insures a bed of freshly worked earth about the plants after they begin to grow.

Three or four plowings with two or more furrows to the row, are given (one plowing every week) with a double shovel plow. Especially is it thought important to plow the crop after every rain. When the tobacco comes in top the plowing ceases. Level culture alone is practiced.

The most vigorous plants are topped without priming to sixteen and eighteen leaves. The average of the first topping is fourteen leaves. The suckers are pulled off at least once and the worms are rarely sought for, though it is thought the worms prefer the White Burley variety to any other. It is succulent and tender, and in my own experience I have found them much more troublesome with this variety. Something may be due to its pale green color, so much like the color of the worms, making it more difficult to find them.

HARVESTING AND CURING.

In about three or four weeks, if the weather should be seasonable after the plants are topped, they are thought to be ripe enough to cut. In this the White Burley growers have decided advantage over the growers of the heavy shipping tobacco. The latter have to wait from six to seven weeks for the crop to ripen. In the meanwhile their best efforts are required to keep the worms and suckers from injuring the product.

Another advantage grows out of the short length of time required for ripening—more acres may be cultivated and cared for by one person. The limit to the number of acres to be cultivated is the ability to keep down the worms and suckers; and as this work is ended within three or four weeks in the Burley districts, and extends to seven or eight weeks in the heavy shipping districts, it will be seen that by successive plantings one person may cultivate and manage during the season considerably more acreage in the former districts than in the latter. From four to five acres are considered a reasonable crop in the Burley region for one hand, while three in the Clarksville heavy tobacco region are thought to be the full measure of one man's capacity to cultivate and care for.

The period between topping and harvesting, however, is by no means a fixed quantity. It varies upon different soils: it is influenced by high or low topping, by the prevalence of wet or dry weather, and by the different exposures. The earliest maturity takes place on warm, southern exposures, and on a quick black or brown limestone soil. Northern exposures, heavy, clayey soils, wet weather, as well as high topping, all delay the time of ripening, but the average length of time between topping and cutting may be put at between three and four weeks.

When fully ripe the harvest begins. The plants are cut with an implement made for the purpose, though a common butcher's knife is used by many for cutting, and owing to its adaptability to other uses, is probably more extensively used than any other implement for this work.

A common hand-saw, with the blade cut squarely off to within eight or ten inches of the handle, and sharpened on the end is preferred by many. The stalk is split as in the heavy tobacco districts already described, and about five plants put on a stick.

A method of cutting and hanging prevails, to some extent, in

Bracken County which is both neat and unusual. Each cutter takes three rows, and as each plant is severed it is straddled over a stick set up in the ground in the center of the space occupied by six plants, that number being allotted to each stick. In this way the plants are cut and hung without being laid upon the ground. This both saves time and secures neatness in handling. These sticks, a little over four feet long, with their loads of tobacco, are either taken directly to the barn and hung twelve inches apart on the tier poles, or are placed upon scaffolds erected in the fields or near the barns. Nearly all the planters scaffold their tobacco and it remains upon the scaffold from five to eight days. This greatly facilitates the curing afterwards and economizes barn room; for space of eight inches between the sticks will be ample after the tobacco has been exposed to atmospheric influences on the scaffold for several days. It is thought also that exposure to the sun for a few days makes it much sweeter and diminishes the danger from houseburn. The tobacco is carried to the barns on a frame having one or two tiers. Some planters use sleds.

No fire is employed in curing the crop. In barns provided with ample facilities for ventilation, about eight or ten weeks are required to perfect the curing. The openings to the barns are not closed either day or night, unless there is an excess of wet weather, when all apertures are closed. Too much dry weather during the process of curing injures the tobacco by decreasing the elasticity and toughness of the leaf and preventing a uniformity of color, leaving the leaves mottled. An old, experienced grower says: "If the weather is very dry it will be changeable in color; if too wet the color will be too dark, but, after cutting, if the weather is fine, with occasional showers, the tobacco will cure a beautiful bright color." There must be dampness enough in the atmosphere to produce a transfusion of the juices through the leaf, and this insures a uniformity of color.

ASSORTING THE CROP.

The tobacco being fully cured it is taken down when in proper condition and assorted into four or five grades, beginning at the bottom of the stalk and going upwards.

The grades are as follows:

First—The sand leaves, trash, or flyings. This grade is made

up of soiled and earth-parched ground leaves, varying in number from one to three leaves.

Second—Good trash or lugs, taken from the stalk next above the ground leaves, varying in number from two to three leaves.

Third—Bright and prime leaves, taken from the central part of the stalk in number from four to six.

Four—Tips, or top leaves, generally a little immature, and reddish or greenish in color, in number from one to three. Two classes of "reds" are sometimes made known as first and second "reds."

Some planters only make three classes or grades, viz: trash, lugs and good, the first being the ground leaves, the second the imperfect leaves, and the third the bright, middle and top leaves. If the tobacco has been topped low there is generally great uniformity in color and length of all the leaves near the top; but if topped high the upper leaves or tips are small and of bad color.

These various grades are tied into bundles of ten or twelve leaves each, re-hung upon sticks, and either crowded upon the tier poles or put upon a platform in coops, each grade being kept separate. When suitable weather for ordering comes, if the tobacco has been put upon tier-poles, the sticks are given a greater distance, so that the tobacco may become sufficiently pliant to handle without breaking, at which time it is taken down, bulked and weighted, each grade being kept separate; or if it has been cooped it is hung thinly upon the tier-poles, and when in proper condition it is taken down and treated in the same manner. Probably the safest way after stripping is to coop it down, because it is then less liable to injury from the vicissitudes of the weather.

A very large proportion of the tobacco grown in the district is sold loose to local dealers who receive it in houses in which conveniences are provided for packing and prizing. From 700 to 1,100 pounds of the highest grades are put in a hogshead, and from 1,200 to 1,800 pounds of trash and lugs. These casks are by no means of uniform size. Some are very large, being five feet high and forty-eight inches in diameter, and they vary in size from this down to fifty-two inches in height and forty inches in diameter. Local dealers buy at all times from the period when the crops can first be examined after curing until the following May or June.

It is estimated that the cost of prizing, shipping and selling the crop, including the cost of hogsheads, will amount to $2 per hun-

dred pounds. This also includes shrinkage in the weight of the tobacco from the time it goes out of the planter's hands until it reaches the market, where it is inspected and sold. This shrinkage is estimated to vary from 3 to 8 per cent., and if the tobacco is permitted to go through sweat before being sold 5 per cent. more should be added.

A crop that has grown upon suitable soil, properly cultivated, kept free from worms, neatly and carefully handled, well assorted into grades, tied in neat hands, artistically packed and prized in hogsheads of the weight required for each grade, will bring in the market from 35 to 50 per cent. more than one that has been handled in a slovenly manner.

There is in the White Burley crop a very wide range in prices, usually varying from 4 to 30 cents per pound, though of course the present depression of values has greatly reduced the ordinary standard. The grades are sometimes classed as smokers, cutters, fillers and nondescript, each of these having subdivisions.

It will be seen that the cultivation of tobacco in the White Burley districts has been much more profitable than in the best shipping districts of the state, and this is due to three facts:

First—A larger amount of land is cultivated for each hand, the proportion being as four to three.

Second—The yield per acre is greater, being in the proportion of eight to five.

Third—The price of the White Burley has been much higher, being nearly in the proportion, for the first few years, of two to one. The value per acre in the White Burley districts is about $90.00, the value of the product per hand employed $450.00. At the same time the value per acre in the heavy shipping districts is $60.00 per acre, the value of the product per hand $180.00. Evidently in the heavy shipping districts of the state the margin of profit in the cultivation of tobacco has been reduced to a minimum.

It may be well here to add that there are many places in Virginia, Maryland, Eastern Ohio, West Virginia and Missouri, where tobacco product is admirably suited for the domestic manufacturer. Some of this is air cured and cured by fire. The methods of curing do not differ, however, from the methods in use in the heavy shipping or yellow tobacco districts. An exception may be made in the case of Eastern Ohio and West Virginia in what is known as the

Spangled district, composed of the counties of Belmont, Monroe, Noble, Washington, and portions of Harrison, Athens, Gallia, Guernsey, Morgan, and two or three counties in West Virginia on the opposite side of the Ohio River.

PULLING OFF LEAVES IN HARVESTING.

The manner of harvesting in this region demands attention, as it is practiced in but few other places in the United States. The variety most generally planted at present is the White Burley and the harvest begins by pulling from the plant four or five of the lower leaves after they are fully ripe. This is done in the morning after the dew is off and the leaves are strung in the field and put upon scaffolds or taken imemdiately to the curing house and strung. The work of stringing is done by girls or women. A needle with a strong thread somewhat longer than the lath or stick upon which the tobacco is to be strung is employed, or a string is used to loop the leaves. Two leaves are pierced in the midrib or looped about an inch from the end of the midrib. These two are hung on one side of the stick. Two more are then strung in the same manner and hung on the opposite side of the stick, and this is continued, two being placed alternately on each side of the stick until it is full. Care must be taken to put the leaves face to face or back to back. If strung back to face in the process of curing they will involve or enfold one another so as to produce damage. When the stick is full the thread is fastened to the other end.

From seventy to one hundred leaves are put upon each stick, the number being regulated by their size. The usual weight of a stick of tobacco thus harvested is one and a half pounds. These sticks are placed upon the tier-poles of the curing house ten or twelve inches apart, but if the tobacco is permitted to remain on a scaffold for four or five days this distance may be decreased to six or eight inches.

In about a week after the first gathering four or five more leaves are plucked from each plant and strung in the same manner. Usually about four gatherings are made before all the leaves are harvested, the object being inferior Lugs and Trash, the leaves being more or less soiled with dirt and punctured with holes and sometimes half destroyed or dried up by the heat of the ground. The last plucking, which embraces the top leaves, is the next least valuable, curing up a dingy green, like the leaves harvested late in the season. The

best selections come from the second and third gatherings. The occurrence of wet weather during the period of gathering indicates a second growth, filling the leaves with fresh sap and militates greatly against the production of fancy colors.

The growers in this district claim many advantages from gathering the leaves instead of cutting the stalk. No leaves are plucked until they are fully ripe; this insures greater weight. The different qualities or grades are kept separate, and less time is spent in assorting and preparing for market. The crop is cured in a much shorter time, less fuel being required. There is great economy in the saving of barn room, the same height required for four tiers when the stalk is housed being ample for six. The trouble of stripping after the product is cured is saved. Cheaper labor can be employed, and girls, who would be of but little service in the housing of the crop in the ordinary way, are by this method of more service than men, because they have more dexterity with the needle.

One-third of the crop is air-cured, and goes into American consumption. The remainder is cured with open fires, and finds a market in Europe. No fires at any time are used for curing in the White Burley districts proper.

It is a singular fact that but little manure or fertilizers are used in the White Burley districts. The soils are naturally very fertile and some growers maintain that stable manure is a disadvantage as it induces field fire and a too rapid ripening. Some sow about four bushels of salt over the land after it is prepared for setting out the plants under the belief that it will preserve humidity and give some protection against cut worms and grasshoppers. There is no doubt, however, that the application broadcast of 400 pounds of ammoniated superphosphate of lime with 8 per cent of potash would greatly increase the yield and add to the value of the product. It should be tried especially upon the hilly soils.

Seed beds are prepared by burning the land thoroughly. Sometimes the land selected for plants is old fence rows or virgin soil. In either case, however, the land is well burned and well prepared before sowing seed. It requires about a heaping tablespoonful for 100 square yards.

SEED LEAF TOBACCO AND ITS CULTURE.

By J. B. Killebrew, A. M., Ph. D.

Seed Leaf Tobacco is grown almost exclusively for making wrappers for cigars. It is not used for chewing purposes nor for making smoking tobacco. The growing of this type is of comparatively recent origin. Previous to 1833 very little, if any, tobacco was grown in Connecticut Valley and that which was grown was narrow in leaf, coarse in texture and undesirable for the manufacturer.

A broad leaf variety was introduced from Maryland about that time, which, under the influence of climate, high culture and a suitable soil, has developed into the now famous Connecticut seed leaf. From the Connecticut Valley its culture extended into the other New England States, and also into Pennsylvania, New York, Ohio, Wisconsin and Illinois.

The entire seed leaf product in 1840 did not exceed 1,000,000 pounds, while the product in 1879 was a little over 90,000,000 pounds. In 1889 the amount grown was 69,500,000 pounds, and in 1895 was reduced to 56,100,000 pounds. About 175,000,000 pounds of cigar tobacco are produced annually in the United States. This includes seed leaf, Narona seed and Sumatra leaf.

The varieties at present grown in the Connecticut and Housatonic Valleys are the Connecticut seed leaf, Connecticut broad leaf, Havana, Havana seed, Belknap, Barber and John Williams. The value of the seed leaf consists in the fact that it is thin, elastic and silky, and is almost tasteless, so that when used as a wrapper for Havana Fillers it does not impair the flavor.

TOBACCO IN CONNECTICUT VALLEY.

In the Connecticut Valley the soils cultivated in tobacco have been in careful and skillful tillage from one hundred to two hundred years or more. The general rotation practiced is, grass several years, after which tobacco is planted for a number of years, two or three usually, but frequently four or five, and then the land is again seeded to grass. It is difficult to have any regular rotation, because the local variations in soil characteristics make some of it peculiarly adapted to the growth of tobacco, while other soils are found to be better fitted for hay, corn, buckwheat, or are more profitable in permanent pasturage.

The soil intended for tobacco is rarely broken in the fall in Connecticut, unless it is a heavy, clayey loam, which needs the

ameliorating effects of freezes to make it crumble well. On sandy land the work of preparation begins in the spring. The land first receives a heavy application of barn yard manure, and is plowed, with a good turning plow, to the depth of six or eight inches. In May it is cross-plowed, or cross-disced, and smoothed. With a "Ridger" beds are thrown up for seed leaf varieties, three and a half feet apart, and for Havana seed three feet. Following behind the ridger, and attached to it generally is a wheel of such a size as to mark on the ridge with small pegs set in the circumference, the places for the plants, which, for the larger varieties are twenty-six inches apart, and for Havana seed eighteen to twenty inches. When very thin tobacco is desired, the distance between the plants is decreased. Hills are very rarely made.

In the raising of a tobacco crop in Connecticut and Housatonic Valleys, manures enter as much into the cultivation and the cost of production as the labor employed. When stable manure alone is applied from five to fifteen cords are used to each acre Probably the district around East Hartford uses a greater variety of fertilizers than any other in the United States. The following table will show the various kinds used, the prices of the same, and the amount applied per acre:

Kinds.	Cost.	Amount Applied per Acre.
Stable manure,	$6 to $8 per cord.	5 to 15 cords.
Castor pomace,	$22 per ton.	2 tons.
Peruvian guano,	$50 to $55 per ton.	300 pounds with 5 cords stable manure.
Superphosphates,	$30 to $40 per ton.	300 to 500 pounds with stable manure.
Bone meal,	$30 to $40 per ton.	Always used with other fertilizers.
Fish guano,	$18 to $20 half dry.	Not much used for Tobacco; is thought to injure the product.
Tobacco stems,	$10 to $14 per ton.	1½ to 4 tons; thought to injure the burning qualities.
Lime,	$1.20 to $2 per barrel.	2 barrels; improves the burning qualities.
Leached ashes,	26 cents per bushel.	Very popular; quality variable.
Newton marl,		2 tons; makes Tobacco of superior quality.
Stockbridge fertilizers,		500 pounds.
Sheep manure,	$8 to $10 per cord.	All that can be obtained.

When it is desired to supplement the application of the stable manure with other fertilizers, the land is furrowed out at the distance intended for the ridges, and the fertilizers drilled in the furrows. On these, other furrows are thrown, so as to make a bed which after being smoothed, is marked for hills by a wheel. Some-

times the commercial fertilizers are sown broadcast over the land, and harrowed in before it is marked off. No attempt is ever made to grow a crop of tobacco without fertilization. Even when the land is rented, the tenant does not hesitate to expend money liberally for fertilizers, sometimes paying out two or three times as much for manures as for rent.

Dr. Riggs, in a Connecticut Agricultural report, gives an exceedingly interesting account of the manner in which he prepared his soils for the growth of tobacco. He says immediately after one crop is taken from the soil the land is ploughed lightly and one and one-quarter bushels of rye sown to the acre. This gets a good start before winter, and in the spring when the time arrives for ploughing for tobacco, the rye is four or five inches high. Two or three weeks before ploughing, a leveling plank is drawn over the rye; the soil is fertilized with 300 pounds of guano to the acre, which is turned under with the rye to the depth of twelve inches. In this condition the land lies until it is nearly ready to prepare it for the plants, when about one-third the quantity of barn-yard manure is applied that would have been applied but for the rye and guano. This manure, with about 400 pounds to the acre of additional guano, is spread over the land and incorporated in the soil by the use of a harrow. The field is then smoothed and permitted to remain untouched for several days until the guano and manure have become absorbed into the soil. The field is then marked off and two furrows thrown on each mark, forming ridges three and one-half feet apart, and hills are made on the ridges twenty-two to twenty-four inches apart. Dr. Riggs says under this preparation his crop yielded from 2,200 to 2,400 pounds per acre.

The very small percentage of land in New England planted in tobacco enables the planter to set out his crop whenever the plants are large enough for transplanting. This is done usually from the 15th of June to the 1st of July, whether the land is moist or dry. In the former case the plants are set rapidly; in the latter every hill is watered and the plant is protected from the sun by tufts of grass or scraps of paper weighted on two sides and bowed over the plant. It is considered of the utmost importance to get a good stand at once, so that all the plants may grow evenly and make a quality of tobacco of uniform texture.

After the plants have been in their places four or five days, and

begin to grow, the earth is loosened about them and the surface of the ground kept in fine tilth. Level cultivation, for the most part, is practiced, and a cultivator frequently used between the rows. The crop is cultivated three times and hoed as many before the plants are large enough to top, which is usually from forty-five to fifty days after they have been transplanted.

TOBACCO IN PENNSYLVANIA.

In Pennsylvania, where the soil is more argillaceous than in Connecticut, it is customary to turn the ground in the fall, and manure is put on, as a general thing, at that time. It is an axiom with the tobacco growers of Lancaster County, the great tobacco center of the State, that tobacco land cannot be made too rich.

After the land has been well pulverized by frequent ploughings, it is thrown up into ridges three and one-half and four feet apart; when the ground is very rich the latter distance is preferred, though the former is thought to be sufficiently wide on thin soils. The distance should, in all cases, be regulated by the probable size of the plant after it has reached maturity. Space enough between rows should be left to enable the planter to walk between without breaking the leaves. Along these ridges indentations are made; the distance between these varies from twenty-two to twenty-eight inches. Upon these indentations the plants are set, but the indentations are never cut down to the general level of the field, as, in that case, the plants are likely to be flooded by heavy rains. The ground is never marked both ways. The common practice in the Southern States is to mark both ways and then make hills at the points of intersection.

The field should be ready to receive the plants when the latter have leaves three inches long. There is a diversity of opinion as to planting in dry weather, some growers being in favor of planting just as soon as the plants are large enough, whether the ground is wet or dry. When plants are set in dry ground, the work is tedious and costly, and great care is required. The water-cart accompanies the planters or a plant-setting machine is used, and water is distributed about the plants and this is repeated a number of times in very dry weather. The result of this frequent watering in dry weather is to induce a baking of the ground about the plants, which checks the growth, and delays cultivation. When set out in moist

weather, the plants grow off quickly, and are soon removed from any danger of the cut worm.

It was the custom formerly to use a pointed stick for setting out, but it was found that the crowding of the roots in a small hole is a serious drawback to the healthy growth of the plant. More attention is now given to this matter. The roots are spread out in their natural position by opening a wide place with the hand or with a dibble, and then covered with earth, which is gently pressed down upon them. A few pains-taking planters put about a half pint of water on the ground where the plant is to be set, and when this has well soaked into the earth the plant is set out. In this case no second water is necessary.

A hot sun long continued often renders some artificial covering necessary. Pieces of paper, the leaves of other plants, or pieces of shingles are used for this purpose.

Plants are often set out before they have attained a proper size. Nothing is gained by this, unless there are timely rains, for they will make more growth in the plant bed in two days than in two weeks in a dry field.

After the field has been planted it should be gone over every day or two for the purpose of destroying the cut worms and replacing the plants which they have destroyed. Sickly looking plants should also be removed or another set by its side so as to supply it place in case it should die.

CULTIVATION OF TOBACCO IN PENNSYLVANIA.

The cultivator or shovel-plow is run twice through each space between the rows, and care is taken that the earth is not thrown upon the plant. The hoe supplements the work of the cultivator, pulverizing the earth near the plant, and is used in drawing a small quantity about it. All grass and weeds are carefully eradicated. The more rapidly the crop is worked the faster it will grow. The hoe and cultivator are kept going every week until the great size of the leaves puts a stop to it.

When the danger from the cut worm has been passed successfully, attention is directed to the destruction of the Tobacco worm. The seed leaf tobacco being used altogether for cigars—making defective leaves unfit for wrappers, greatly depreciates the value of a crop—the plants are examined carefully two or three times a week, so that the eggs and small worms may be destroyed before damaging

the leaf. Poisons are used for destroying the moths that lay eggs by dropping some of the fluid solution into the flowers of Jimpson weeds. Beds of petunias are raised in Illinois and Wisconsin, to which the moths are attracted, when they are knocked down with paddles and killed. The hunt for worms continues until the tobacco is put in the sheds.

TOPPING.

In regard to topping every grower is a law unto himself. The number of leaves to be left upon each plant is regulated and modified by varieties of tobacco and soil, by seasons and the condition of the crop. The custom is to top about the time the blossom makes its appearance, which is about the first of August in the seed leaf districts; others top as soon as the desired number of leaves can be secured. The latter is unquestionably the better practice, as in that case the vitality of the plant is not wasted in forming leaves and flowers which are not permitted to remain. When the soil is thin and plants backward, or, when the season is dry, low topping becomes a necessity. Under these circumstances, from eight to ten leaves only are left on each plant. When the soil is rich, growth strong and healthy, and season favorable, from twelve to sixteen leaves are allowed to each plant. If plants of equal size are set out at the same time, and the soil uniform as to fertility and exposure, the period of topping will not vary much in a field, and this is accounted a great advantage, as the crop will mature evenly, and the color and texture will be more uniform.

No priming is done, as in the Southern States, but only the soiled or earth-parched leaves are taken off or left upon the stalk at the time of cutting.

Dry weather is dreaded at topping time. Some growers prefer to let the lower leaves drop off, rather than to top in a period of drouth. By postponing the time of topping ripening is retarded, which, under the circumstances, is a very important advantage.

Oftentimes the cupidity of the grower causes him to top too high, leaving more leaves than the stalk can mature. When this is done, and a drouth succeeds, the tobacco ripens prematurely and cures up a bad color.

The tobacco in Connecticut, Pennsylvania and other seed leaf districts is usually suckered twice—the first time within a week after being topped and then again just after cutting.

HARVESTING.

About two or two and a half months from the time of setting out the crop, it will be ready to harvest, if it has been properly cultivated and the season has been propitious. In about twenty days after it is topped (in Wisconsin ten days), the leaves assume different shades of color and become somewhat brittle, and when doubled over, have a tendency to break. It is then ready to cut.

In this respect the seed leaf growers have a decided advantage over the growers of shipping tobacco. Six weeks are required after topping to ripen the latter properly, and the worms and suckers have, in the meantime, to be subdued.

It is thought in the seed leaf districts that the best time for cutting is when the expansion of the leaf ceases, and granulation begins. Experience has demonstrated the fact that if cut at this time the color will be darker. Early cutting places the crop beyond the reach of hail-storms, heavy rains and winds, and early frosts. It is thought best not to cut immediately after a rain, as the gum or resin secreted by the hair-like glands of the leaf is dissolved, and in part washed off. A few days of sunshine will restore this.

The tobacco plants are cut off carefully with a sharp hatchet, or sawed off with a sharp saw, and laid gently down upon the ground, where they remain until they wilt sufficiently to be handled without breaking.

From 3 o'clock until 6 in the afternoon, after the sun's rays have been tempered, is the best time for cutting. Should there be danger of sunburn the plants should be turned over or placed in piles of six or eight with heads towards the sun.

After the plants are wilted they are speared on the laths. From five to eight plants are put upon each lath. The custom of scaffolding in the field is largely practiced. It is thought, however, that scaffolding in the field can be more safely dispensed with in the case of early-cut tobacco than with that harvested late in the season, because during warm weather it is not likely to suffer any danger in the barns except from pole sweat, which can be avoided by giving the laths sufficient space on the tier-poles and securing proper ventilation. As the later-cut tobacco dries much less rapidly, it is in more danger from pole-sweat and from freezing, hence the rapid desiccation which is obtained by exposure on the scaffolds in the open field is greatly to be desired late in the season. There are

those, however, who, when they have ample storage room, scaffold neither the late nor the early tobacco, but take it immediately to the sheds. Usually a spot for the erection of scaffolds is selected under the shade of trees.

Many new methods of harvesting tobacco have been tried, among others a new way of attaching the tobacco stalks to the lath, which is claimed to possess many advantages over the method of spreading them. Laths heavier than those ordinarily employed are used for this purpose. This size is three-quarters of an inch thick, one and one-half or two inches wide, made of pine, poplar, or some other light wood, and is one of the usual length, four or four and one-half feet. Into this stout lath six iron or wire hooks are driven.

Three of these are driven in each side of the lath, the first one four inches from the end, the next sixteen inches from the first, and the third sixteen inches from the ground, leaving a space of twelve inches from the last to the end of the lath. Hooks are driven midway between these on the opposite side of the lath, and one within four inches of farthest end of the lath, thus giving room for six large stalks, eight inches apart, hanging alternately on one side of the lath and on the other. In this way they do not interfere with one another, and may be hung much closer, for there is no waste of space, the alternate hanging filling up not only the space on the same lath but also between all the laths when arranged in the barn.

There are several objections to these hooks which have prevented their general use. They are too expensive for the majority of tobacco farmers. The principle, however, is so excellent that a substitute much cheaper was soon devised. Instead of iron hooks six penny nails are used. These are driven through the laths at regular intervals, alternately from one side, and then from the other, with a slight upward inclination to prevent the plants from falling off too readily. This method is equally as good a one and much cheaper, and it is said that no planter who has once tried it in the seed leaf district will be likely to give it up.

The advantages claimed by this method of hanging tobacco over that of splitting the stalk, as in the South, or in spearing, as practiced in most of the seed leaf States, are as follows:

1. The large hole made in the Tobacco stalk by the spear has a tendency to dry out the stalk too rapidly at that point, and the same may be said of the stalk when it is split. The more slowly the stalk

dries the better and more uniform the color of the leaf is likely to be.

2. Time is saved, for it is easier to stick a stalk on a nail than to pierce it with a spear.

3. The tobacco is not so much injured. The spear often comes in contact with one or two of the leaves, where the orifice is made, and these leaves are ruined for wrappers.

4. The tobacco is more easily taken from the sticks when stripping time comes on.

5. When once hung on the nails no other adjustment of the stalk is necessary. The place of each plant is definitely fixed, which is by no means the case when hung on laths, as the utmost care must be taken that they are put at regular intervals.

The best farmers have an arrangement behind the axle of the tobacco wagons where the empty laths are carried. At the rear end of the wagon frame are iron hooks, upon which the lath is placed, while the stalks are attached to the nails. As fast as a lath is filled it is carried forward and put upon the frame of the wagon. In this way the tobacco is handled but once and is not thrown upon the ground to be picked up again, oftentimes with damaged or dirty leaves. When the tobacco wagon cannot be taken through the field a tripod about four feet high, with iron hooks attached to the upper arms, is employed to hold the laths while the tobacco is put on the nails.

A boy can take the stalk from the man who cuts it off and place it where it belong on the laths. A small trestle is sometimes used which, though only intended for a single lath, answers the purpose admirably.

There is no special time during which tobacco is allowed to hang on the scaffolds, but this time may vary from three to ten days. No injury is likely to occur to the tobacco while on the scaffold unless heavy rains come. It is then liable to get into a "strut" and become very tender.

The removal of the tobacco from the scaffold to the barn was, a few years ago, accomplished by laying the tobacco flat on a wagon bed, piling one stick above another. This compressed the leaves together so much as seriously to retard successful curing. More recently in Pennsylvania a wagon has been made especially adapted to this work. A frame, eighteen feet long, and somewhat narrower

than the length of the laths, the upper rails of the frame having a cleat nailed or battened on the outer edges, and projecting above them an inch or more to prevent the laths shifting endwise, is placed upon a low wheeled wagon, and the laths are transformed from the scaffold to the wagon and hung upon the frame work. They are then easily removed to the shed or barn without injury to the plants.

When taken from the field the tobacco is hung up at once in the barn. The barn is filled from the top downwards, in sections. The wagon is drawn under the sections to be filled. The best regulated barns have an arrangement of ropes and pulleys by which the laths are hauled to their places at the top of the barn, and to all the intermediate tiers. Generally, however, the laths, filled with tobacco, are passed from hand to hand upwards and placed upon the tiers. The leaves are well separated, and the plants arranged on the lath as each one is put in its permanent position. Placing the laths at proper distances is also important. If too close, "pole burn" will result; if too wide apart valuable space is lost. From six to eight inches is considered the proper distance for large and small tobacco.

An old method of putting tobacco in the sheds was to dispense with the laths altogether, and tie with twine each plant to the tier pole. The plants were tied on alternate sides of movable tier-poles, from eight to twelve inches apart on a side. Some few farmers still adhere to this ancient method and discard the lath and spear altogether. It requires much more time to harvest tobacco in this way, but it is claimed that the number of leaves damaged is much less, as each plant when tied to the poles has its distance distinctly marked, and as the poles are put a foot to fifteen inches apart, currents of air can circulate more freely among the plants. Hanging in this manner, however, is a very tedious process, and though it may have some advantages over the spear and lath systems, the greater care and the longer time demanded at a period when time is the most valuable to the tobacco growers have, to a considerable extent, brought it into disuse.

CURING SEED LEAF TOBACCO.

In the process of curing proper ventilation is an all-important factor. The question of ventilation is all important and must be carefully provided for in the curing houses.

Some dampness during the curing process is believed to be essential to the proper curing of tobacco. In other words, frequent

rains are desirable, alternated with dry weather. Planters dread a drought during the period of curing as much as during the growing season. The rule governing the matter is that the tobacco shall become damp at least once a week. If the weather be very moist the doors are kept closed to prevent pole sweating; if it is very dry so as to hasten the curing process too rapidly the doors are closed and the floors of the barns dampened.

The periodical dampenings cause the juices to permeate the leaf and promote uniformity of color; but if the tobacco is subjected to too much moisture there is a tendency to create mould. The texture of the leaf also is impaired by the excessive absorption of water which, when it evaporates, carries away some portion of the oil that gives it softness and silkiness.

The most difficult problem in wet weather is how to prevent injury from these sources without the use of artificial heat. The practice is to close the shed securely and shut out as much moisture as possible.

A very intelligent grower in New Haven County, says: "The openings should be made at the top of each tier horizontally instead of perpendicularly as the old style is. The building should be constructed so that it can be shut up tight in very dry or windy weather. Give plenty of air for two or three weeks after it is first housed, then let the tobacco cure slowly by closing the doors during the day and opening them at night, so that the tobacco may receive moisture. This will give a uniform color."

Some planters prefer to keep doors open day and night for two weeks after hanging, that the dampness of the night may equalize the dryness from the day.

Peruvian guano, used as a fertilizer, is thought to induce dark colors, and gypsum sprinkled on the plant while growing will cause the cured product to assume a darker color. Thin leaves, very fine and delicate, are always disposed to cure up light colors.

It requires from ten to twelve weeks for seed leaf tobacco to cure fully. When the leaves and stalks are fully cured so that no green is visible a time is selected for taking down when the tobacco is very moist.

The leaves are stripped off without assorting and packed in bales a foot square and three or four feet long. The bales are made by taking a box of the proper size and lining the bottom and sides with

paper, under which strings are passed and brought out on the sides of the box. The leaves are laid on the paper in the box in a double course, the butts of the leaves to the ends of the box, and the tails overlapping the center. When the box has been filled, no pressure being used, the paper is folded over the top of the tobacco in the box and the strings tied. The bundle is then lifted out and put in piles.

Each bale will weigh about forty pounds. It is ready then for delivery to the packers who usually buy from the planters. The packing establishments are very numerous, and are provided with assorting tables, prizes, and other conveniences for handling the tobacco.

The quality of the crop is determined by the wrappers. If the proportion of wrappers, as compared with the other grades, is large, the price will be correspondingly high, the quality, size, texture and color of the wrapper determining the price. A large, coarse wrapper, for example, is not so desirable as a smaller but finer one; nor is a fine wrapper of bad color as valuable as one coarse in texture but of uniform color. The best wrappers are characterized by fineness of fibre, largeness of leaf, uniformity of fashionable color and a satin finish; are free from white veins and have an elasticity and strength of leaf sufficient to bear the strain required in wrapping cigars.

Twelve pounds of the best Connecticut wrappers will make 1,000 cigar wrappers. Ten pounds of the best Havana seed wrappers will make 1,000 cigar wrappers. The latter, though not of such large size, will yield more wrappers to the pound, and is, therefore, more valuable, being worth about 5 cents per pound more. It is fast taking the place of the larger varieties on this account.

ASSORTING CIGAR TOBACCOS.

In assorting the seed leaf, four grades are made, as follows:

1. Wrappers; constituting, in a good crop, one-half; only perfect leaves go into this grade.

2. Medium wrappers; constituting one-fourth of the crop; leaves with a few blemishes are admitted.

3. Seconds; or binders; constituting three-sixteenths of the crop, leaves torn, with some good places, make this grade.

4. Fillers; constituting one-sixteenth of the crop, and made up of ground leaves and those badly worm-eaten.

Havana seed is graded somewhat differently. Wrappers are graded into two lengths, viz.:

1. Long wrappers.
2. Short wrappers.

These ought to constitute three-fourths of the crop while the seconds and fillers make up the remainder. This Havana seed is grown from seed three or four years removed from the imported Havana seed. The farther removed the nearer it approximates the Connecticut seed leaf. The first planting from imported seeds grows very tall with small leaves. Every succeeding year the leaves increase in size. It is thought the highest quality is produced the fourth year, as the quality of wrappers is then at a maximum, the leaf of good size, the fibres fine, and the finish silky.

At the time of assorting, the tobacco, unless already tied into hands by the farmer, is made into bundles of about sixteen leaves and bulked down in two courses, the heads being turned outwards and the tails overlapping about six inches in the middle, the idea being to expose the heads so that the fat stems may be dried out. The ends of the bulks are usually protected by boards. Bulks are made on temporary platforms raised a few inches above ground so that the air can circulate freely under them and are from four to five feet wide, and of any length desired. Two bundles are laid down at a time until a course is run on one side of the platform.

A similar course is run on the other side, and the tails are lapped so as to equalize the height in the middle of the bulk. The middle should never be suffered to fall below the level of the bulk. The condition of the tobacco when bulked is very moist, a much higher degree of moisture being permitted with seed leaf than with shipping tobacco. After the bulk has been built up to the height of four feet it is covered with blankets and weighted down, in which condition the tobacco remains for a short time when it is ready to be packed in boxes. Should the sweating process begin in the bulk, it should not be disturbed, for if disturbed and the tobacco exposed to the atmosphere when heated, it will be greatly injured and become harsh, which no subsequent manipulation will remedy. A cord of rich tobacco, well packed and weighted, will weigh a ton.

A great deal of care is required in assorting. Indeed, none but experts should be put to this work. For this reason but few growers assort their own crops, but prefer to sell it in bales as already described.

DEALERS.

Dealers examine the crop very thoroughly before buying, and even while it is growing agents ride from farm to farm to examine the crop in the field, the culture, size, amount of damage done by worms and ru Even the regularity or irregularity of the crop is noted. After the crops are housed the same agents will visit the sheds to see that there is no pole-sweated, wind-shaken or weather-beaten tobacco, and also to examine the uniformity or diversity of color. After the leaves are picked from the stalk there is another examination to note its condition. The vigilance on the part of dealers has had a happy effect in stimulating planters to handle their crops with the greatest care.

It is a noticeable fact that in the seed leaf districts the leaves are not broken off, as in the shipping districts, but slipped off, carrying a part of the stalk with them. In a large crop this will make a very perceptible addition to the weight. The seed leaf tobacco is always handled when very moist, indeed so moist that it would be considered hazardous to risk the condition in shipping districts. This high condition is thought to be necessary to protect the wrappers from breakage. Too much humidity in the crop on the other hand will produce a fermentation so excessive as to destroy the vitality of the tobacco and induce a mould which will impart a disagreeable odor.

Good judgment is required to determine the proper order. If bulked in very cold weather the amount of humidity in the leaf is apt to be underestimated, and if a warm spell supervenes the tobacco will be endangered. The plan pursued by the best managers is to see first of all that the stems or midribs are well cured, and that they do not hold a disproportionate amount of moisture, as compared with the leaf. Should the leafy part be very dry, and the stem be very moist, there is more danger from injury by excessive fermentation than if the condition of the leaf and midrib were reversed. The proper condition is to have the leaf soft and pliant, and the midrib just sufficiently moist to handle without breaking.

The following will show the sizes of boxes used for the various grades:

SEED LEAF.

	Length.	Capacity Pounds.
Wrappers	3 ft. 8 in. x 28 in. square	400
Med. Wrappers	3 ft. 8 in. x 28 in. square	375
Seconds	3 ft. 3 in. to 3 ft. 6 in. x 28 in square	350
Fillers	3 ft. x 28 in. square	325

HAVANA SEED.

	Length.	Capacity Pounds.
Wrappers	3 ft. 6 in. x 28 in	375
Short Wrappers	3 ft. 3 in. x 28 in	350
Seconds	3 ft. 3 in. x 28 in	350
Fillers	3 ft. x 28 in	325

Some pressure is required to get the quantity mentioned in the boxes. This pressure is applied with a double lever press resting upon wheels so that it be may readily moved to any part of the building.

The tobacco is always packed lengthwise the box, never crosswise. The following directions for packing are taken from a Miamisburg (Ohio) paper and fully accord with the information I gathered on the subject:

Have your boxes made to suit the growth to be packed—that is, if the leaf is small do not attempt to pack it in a forty-inch box; have the cases adapted to the size of the leaf.

Have the boards at the ends of the cases narrow, with spaces of one-fourth inch between the boards to provide for evaporation and prevent damage.

Never, under any circumstances cross-pack in the boxes—damaged tobacco is always sure to result. When the leaf is so small as to require cross-packing even in a small case, nail a partition in the center of the box, making a double packing with the butts facing the ends, as usual, and also facing the partition. Bore holes along the partition on both sides of the box.

Use headboards in packing sufficient to keep the butts of the tobacco away from the ends of the cases about one inch.

Put tobacco into cases in just the proper condition—neither too low nor too high. This is a delicate question, unless the planter has been careful to note the condition of his crop all along, and if the leaf is packed, as is often the case, in cold sheds, the packer is in danger of being misled. In a cold atmosphere, very wet leaf will appear to be in a proper condition, but the moment the temperature is raised it will reek with moisture. The packing should be done in a temperate atmosphere, or, if necessity compels, an armful of leaf can be tested in a warm room to ascertain the amount of moisture retained by the leaf. The danger from this source is often increased by the application of water while bulking in cold weather.

About 300 pounds to the case, net, is a good basis for Zimmer's

Spanish, when the leaf is in proper condition. If the leaf is high, less; and if low more pressure is required, but nearly all the mischief that results in sweating is due to attempting to remedy too high or too low conditions by variations in packing.

See that the leaf goes into the cases in proper order—lap well—leaving no vacant spaces to attract moisture; use headboards, provide spaces between boards at ends of cases; put on firm pressure—that is, don't mash or squeeze—and your crop will come out with flying colors.

SWEATING.

The tobacco is always packed with headboards, which are withdrawn when the boxes are full, leaving the space of an inch between the heads of the tobacco and the inside ends of the box. The boxes are turned upon the sides and put in a secure place, after being nailed up and left to undergo the process of fermentation or sweating.

This process begins in June and continues for two or three months, during which time the tobacco reaches a temperature of 150 degrees or even more. All cases are marked with the weight, quality, name of grower, etc. The sweating process ripens tobacco as fermentation does wine. It perfects its color, improves the flavor, subdues the acid and pungent taste, increases its burning qualities, and gives it, when well done, a shining, oily surface, which is called "satin face." All tobacco does not go through this trying process well, as all wines do not ferment well. Some of it comes out with a dull, lifeless appearance.

Tobacco, like wine, will often go through a second fermentation the ensuing year with an improvement in quality. It is said that not over one per cent. is injured by over-sweating. The greatest loss sustained is in the reduced weight, which amounts to ten or fifteen pounds in the hundred, varying with the thinness or thickness of the leaf, the quantity of gum, etc.

After it has gone through the sweat the ends of the boxes are opened and samples are drawn from different parts of the boxes by inspectors who guarantee that the samples are a fair average. These samples are labeled and carefully kept in close boxes and sales are made by them.

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